1) Quantitative spectroscopy

2) Absorption of light: quantum interpretation

- Light is made of photons with energy $E = h\nu$; $h=6.626 \times 10^{-34}$ J s

- Molecules can only exist in specific energy states
**Concept**

Consider two different systems, with the following energy levels

System A

\[ \begin{array}{c}
E_1 \\
E_2 
\end{array} \]

System B

\[ \begin{array}{c}
E_1 \\
E_2 
\end{array} \]

Which of the following could be true:

a) The systems absorb light of the same color.
b) System A absorbs red light and System B absorbs blue light.
c) System A absorbs blue light and System B absorbs red light.

Which of the following could be true:

a) The systems have the same color.
b) System A appears red and System B appears blue.
c) System A appears blue and System B appears red.

3) **Demo: spectrum glasses**
4) **Photoelectric effect**

When light, with a wavelength of $2.50 \times 10^{-7}$ m, falls upon a piece of Chromium (Cr) in an evacuated glass tube, a photoelectron is emitted. If the binding energy for Cr is $7.29 \times 10^{-19}$ J, what is the kinetic energy of that photoelectron?

\[
\frac{1}{2}mv^2 = \text{kinetic energy of photoelectron}
\]

**Concept**

A red light with $10^5$ photons per second is hitting a material, and $10^4$ electrons per second are being emitted. The intensity of the light is doubled to $2 \times 10^5$ photons per second.

a) the number of ejected electrons is doubled, and they have more kinetic energy.
b) the number of ejected electrons is doubled, but their kinetic energy is unchanged.
c) the number of ejected electrons is unchanged, but they have more kinetic energy.
d) the number of ejected electrons is unchanged, and their kinetic energy is unchanged.
5) Energy units
6) DeBroglie wavelength
7) Particle in a box